

TOSHIBA BIPOLAR DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

**TD62304P, TD62304AP, TD62304F, TD62304AF**  
**TD62305P, TD62305AP, TD62305F, TD62305AF**

## 7CH LOW ACTIVE DARLINGTON SINK DRIVER

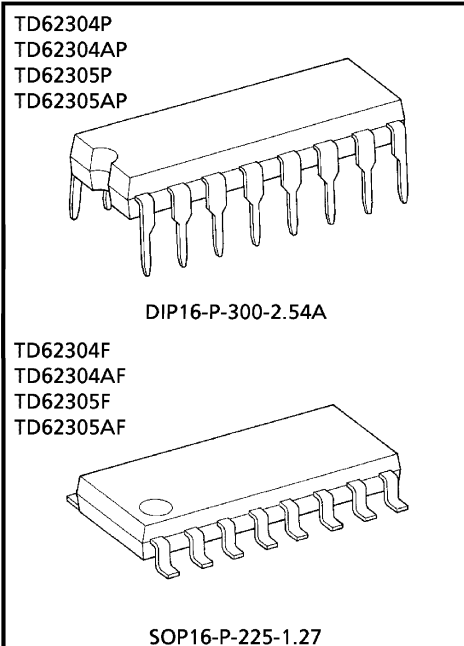
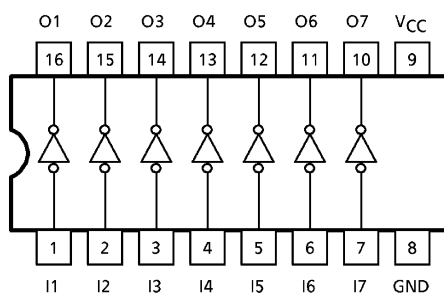
The TD62304P/AP/F/AF and TD62305P/AP/F/AF are non-inverting transistor arrays, which are comprised of eight NPN darlington output stages and PNP input stages.

These devices are Low Level input active drivers and are suitable for operations with TTL, 5V CMOS and 5V Microprocessor which have sink current output drivers. Applications include relay, hammer, lamp and LED driver.

### FEATURES

- Output current (single output) 500mA (Max.)
- High sustaining voltage 35V (TD62304P/F, 62305P/F) 50V (TD62304AP/AF, 62305AP/AF) (Min.)
- Low level active input
- Standard supply voltage
- Input compatible with TTL and 5V CMOS

### PIN CONNECTION (TOP VIEW)



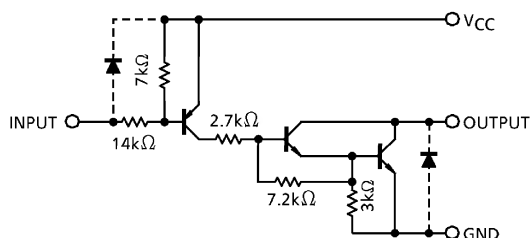
Weight  
DIP16-P-300-2.54A : 1.11g (Typ.)  
SOP16-P-225-1.27 : 0.16g (Typ.)

961001EBA2

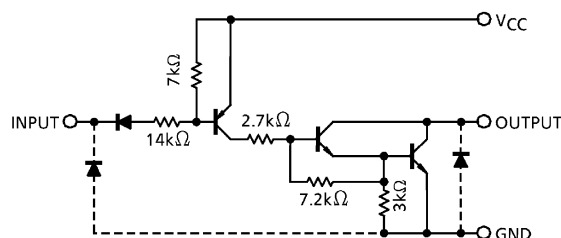
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**SCHEMATICS (EACH DRIVER)**

TD62304P / AP / F / AF



TD62305P / AP / F / AF



(Note) The input and output parasitic diodes cannot be used as clamp diodes.

**MAXIMUM RATINGS (Ta = 25°C)**

CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		$V_{CC}$	- 0.5~7.0	V
Output Sustaining Voltage	P, F	$V_{CE(SUS)}$	- 0.5~35	V
	AF		- 0.5~50	
	AP		- 0.5~50	
Output Current		$I_{OUT}$	500	mA / ch
Input Voltage		$V_{IN}$	- 22~ $V_{CC} + 0.5$	V
			- 0.5~7 (Note 1)	
Input Current		$I_{IN}$	- 10	mA
Power Dissipation	P	$P_D$	1.0	W
	AP		1.47	
	F, AF		0.625 (Note 2)	
Operating Temperature	P	$T_{opr}$	- 30~75	°C
			- 40~85	
Storage Temperature		$T_{stg}$	- 50~150	°C

(Note 1) TD62305P / AP / F / AF

(Note 2) On glass epoxy PCB (30 × 30 × 1.6mm Cu 50%)

RECOMMENDED OPERATING CONDITIONS ( $T_a = -40 \sim 85^\circ\text{C}$  and  $T_a = -30 \sim 75^\circ\text{C}$  for Type-P)

CHARACTERISTIC		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage		V <sub>CC</sub>	—	4.5	5.0	5.5	V
Output Sustaining Voltage	P, F	V <sub>CE (SUS)</sub>	—	0	—	35	V
	AF			0	—	50	
	AP			0	—	50	
Output Current		I <sub>OUT</sub>	DC 1 circuit	0	—	350	mA / ch
			T <sub>pw</sub> = 25ms, duty = 10% 7 circuits	0	—	300	
			T <sub>pw</sub> = 25ms, duty = 10% 7 circuits	0	—	350	
			T <sub>pw</sub> = 25ms, duty = 20% 7 circuits	0	—	200	
Input Voltage	TD62304P / AP / F / AF	V <sub>IN</sub>	—	− 20	—	V <sub>CC</sub>	V
	TD62305P / AP / F / AF			0	—	5.5	
Power Dissipation		P	—	—	—	0.44	W
		AP	—	—	—	0.52	
		F, AF	(Note 1)	—	—	0.325	

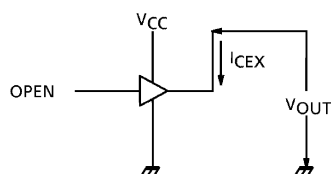
(Note 1) On glass epoxy PCB (30×30×1.6mm Cu 50%)

ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )

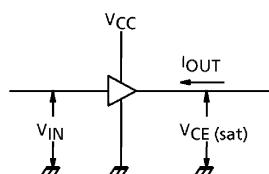
CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Leakage Current	P / F	I <sub>CEX</sub>	1	V <sub>CC</sub> = 5.5V V <sub>IN</sub> = 0V	V <sub>OUT</sub> = 35V, Ta = 75°C	—	—	− 100	μA
					V <sub>OUT</sub> = 50V, Ta = 85°C				
Output Saturation Voltage		V <sub>CE (sat)</sub>	2	V <sub>CC</sub> = 4.5V I <sub>OUT</sub> = 350mA	V <sub>IN</sub> = V <sub>IN (ON)</sub> MAX.	—	1.4	2.0	V
Input Current	(Output On)	I <sub>IN (ON)</sub>	3	V <sub>CC</sub> = 5.5V, V <sub>IN</sub> = 0.4V		—	− 0.32	− 0.45	mA
	(Output Off)	I <sub>IN (OFF)</sub>	4	V <sub>CC</sub> = 5.5V, V <sub>IN</sub> = − 20V		—	—	− 2.6	
				—		—	—	− 40	μA
Input Voltage (Output On)	TD62304	V <sub>IN (ON)</sub>	5	—		—	—	V <sub>CC</sub> − 2.8	V
	TD62305					—	—	V <sub>CC</sub> − 3.7	
Supply Current	(Output On)	I <sub>CC (ON)</sub>	6	V <sub>CC</sub> = 5.5V, V <sub>IN</sub> = 0V		—	17	22	mA
	(Output Off)	I <sub>CC (OFF)</sub>	6	V <sub>CC</sub> = V <sub>IN</sub> = 5.5V		—	—	100	μA
Turn-On Delay	P, F	t <sub>ON</sub>	7	V <sub>CC</sub> = 5V C <sub>L</sub> = 15pF	V <sub>OUT</sub> = 35V, R <sub>L</sub> = 87.5Ω	—	0.1	—	μs
	AP, AF				V <sub>OUT</sub> = 50V, R <sub>L</sub> = 125Ω				
Turn-Off Delay	P, F	t <sub>OFF</sub>			V <sub>OUT</sub> = 35V, R <sub>L</sub> = 87.5Ω	—	3	—	
	AP, AF				V <sub>OUT</sub> = 50V, R <sub>L</sub> = 125Ω				

## TEST CIRCUIT

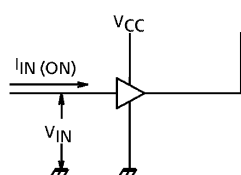
1. I<sub>C</sub>EX



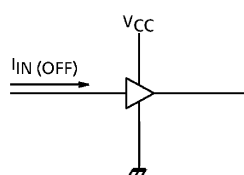
2.  $V_{CE}(\text{sat})$



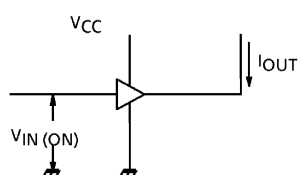
### 3. IIN (ON)



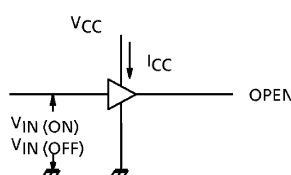
#### 4. I<sub>IN</sub> (OFF)



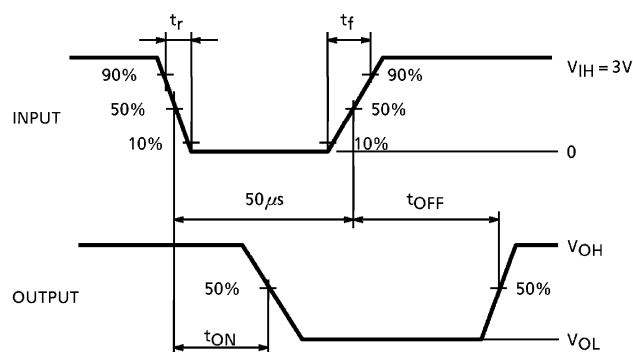
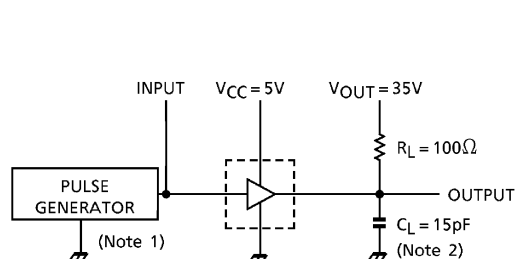
### 5. $V_{IN} (ON)$



6. ICC



### 7. $t_{ON}$ , $t_{OFF}$

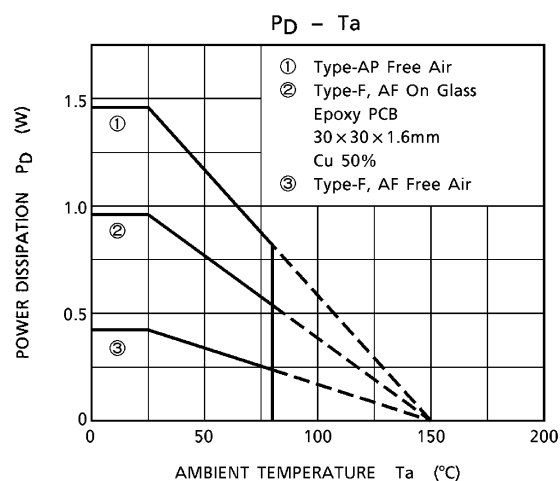
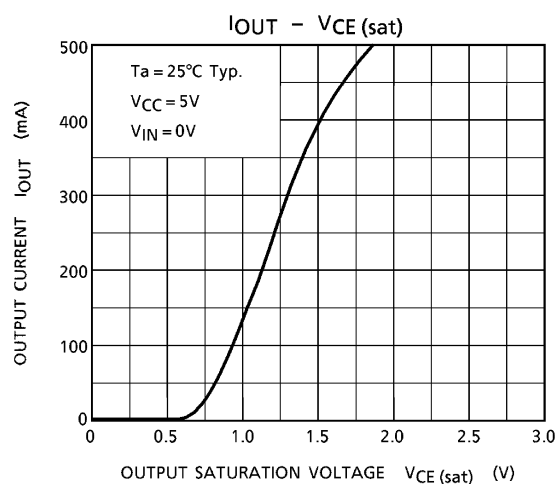
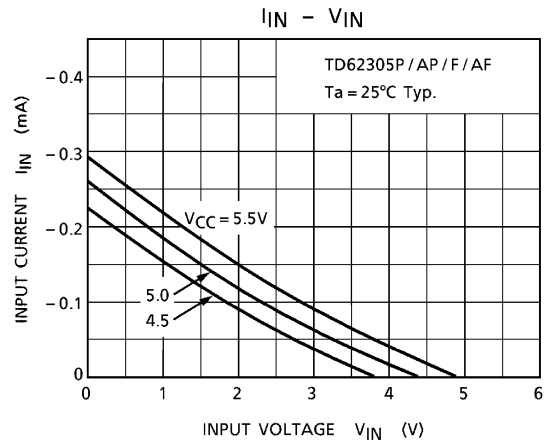
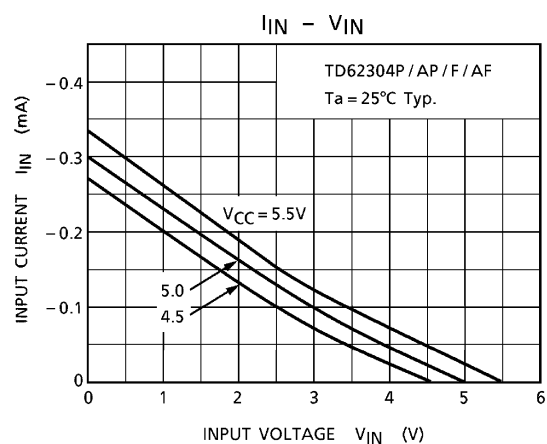
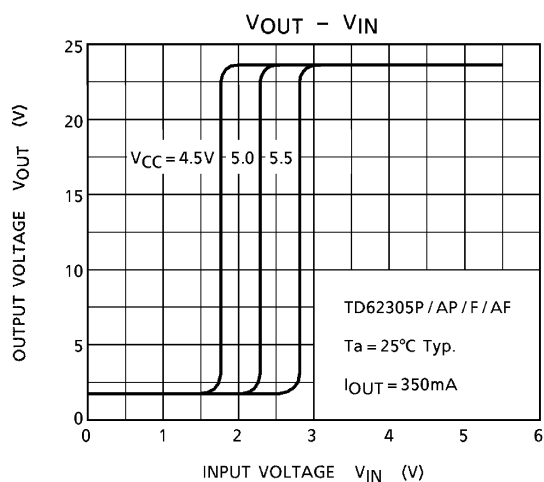
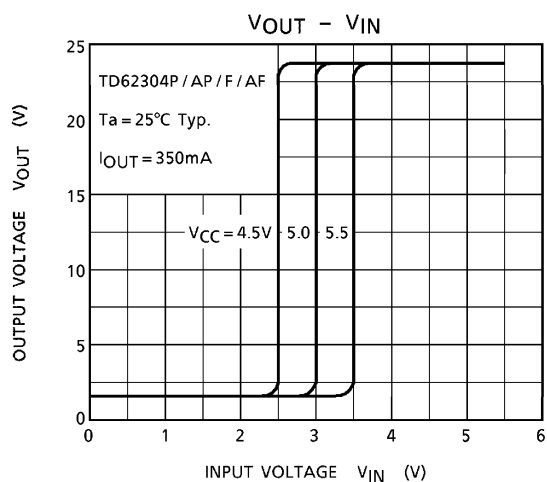


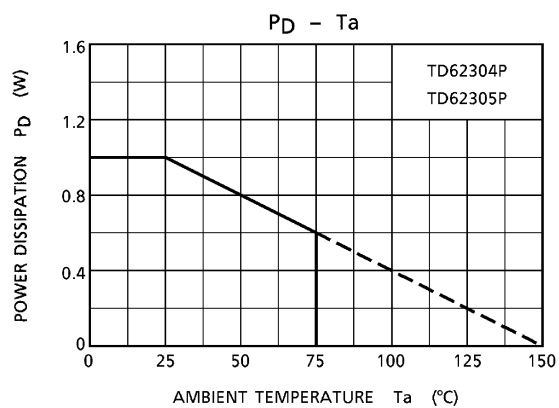
(Note 1) Pulse width  $50\mu\text{s}$ , duty cycle 10%  
Output impedance  $50\Omega$ ,  $t_r \leq 10\text{ns}$ ,  $t_f \leq 5\text{ns}$

(Note 2)  $C_L$  includes probe and jig capacitance.

## PRECAUTIONS FOR USING

Utmost care is necessary in the design of the output line,  $V_{CC}$  and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.

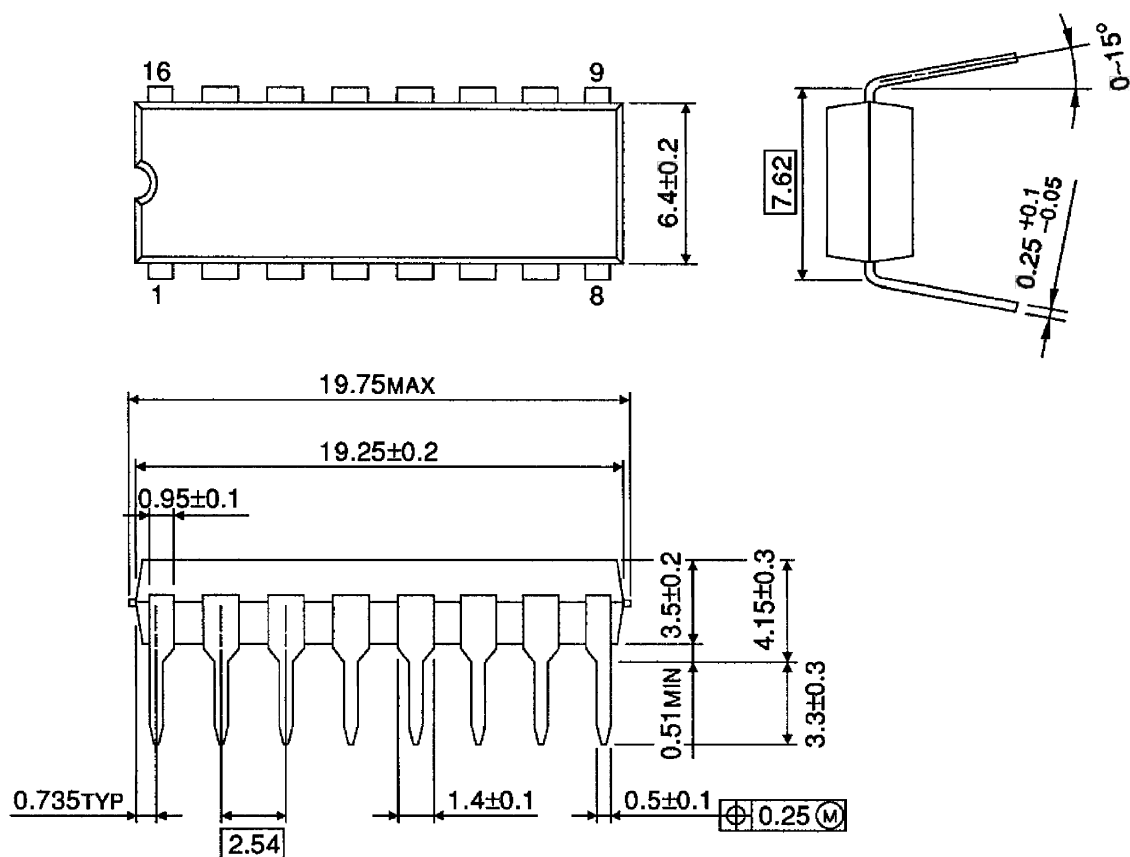




**OUTLINE DRAWING**

DIP16-P-300-2.54A

Unit : mm

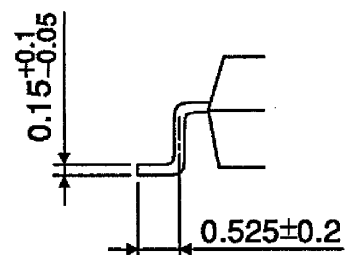
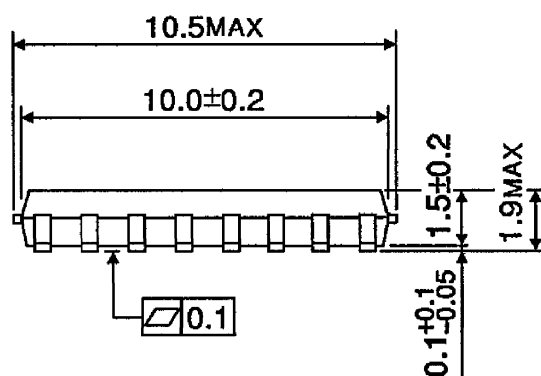
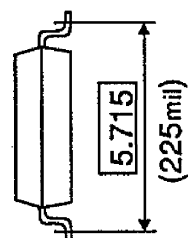
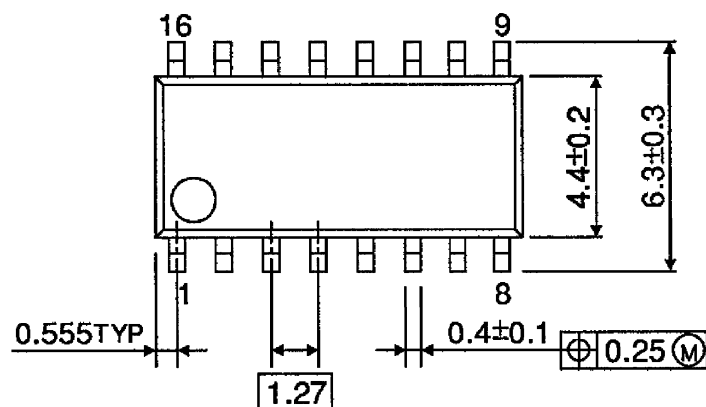


Weight : 1.11g (Typ.)

**OUTLINE DRAWING**

SOP16-P-225-1.27

Unit : mm



Weight : 0.16g (Typ.)



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